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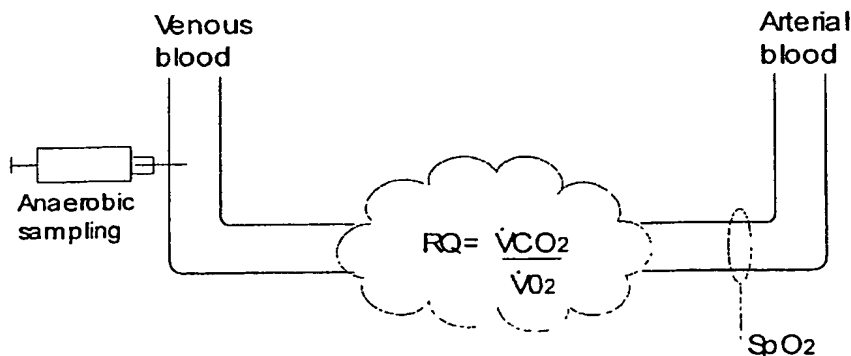
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- Published:
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- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: METHOD FOR CONVERTING VENOUS BLOOD VALUES TO ARTERIAL BLOOD VALUES, SYSTEM FOR UTILISING SAID METHOD AND DEVICES FOR SUCH SYSTEM



(57) Abstract: The invention relates to methods of converting venous blood values to arterial blood values. This has the advantage that arterial blood samples need not be taken, and the disadvantages compared to venous blood samples when taking arterial blood samples are eliminated. The method is basically based on three steps, namely the step of measuring arterial oxygenation, the step of measuring and estimating values of venous blood acid/base status and oxygenation status of a venous

blood sample, and the step of converting the venous blood values by applying a mathematical model for deriving blood acid/base status and oxygenation status into estimated arterial blood values.

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/DK 03/00512

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 A61B5/145 G01N33/49

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A61B G01N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, MEDLINE, BIOSIS, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| P,A | US 2002/120185 A1 (JOHNSON ROYCE) 29 August 2002 (2002-08-29) abstract; figures 1-3 --- | 1-25 |
| A | US 6 206 830 B1 (KIANI-AZARBAYJANY ESMAIL ET AL) 27 March 2001 (2001-03-27) the whole document --- | 1-25 |
| A | US 6 163 715 A (REUSS JAMES L ET AL) 19 December 2000 (2000-12-19) abstract; figures 1,2 --- | 1-25 |
| A | WO 00 45702 A (KJAERGAARD SOEREN CHRISTENSEN ; REES STEPHEN EDWARD (DK); THORGAARD) 10 August 2000 (2000-08-10) page 16, line 10 - line 17 page 17, line 17 - page 18, line 30 abstract; figures 4,10 --- -/-- | 1-25 |

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

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"&" document member of the same patent family

Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/DK 03/00512

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| A | US 5 687 718 A (FISCHER BERNHARD ET AL) 18 November 1997 (1997-11-18) column 1, line 5 - line 11; figures 1,2 --- | 1-25 |
| A | S.E. REES ET AL: "A dynamic model of carbon dioxide transport in the blood" IFAC SYMPOSIUM ON MODELLING AND CONTROL IN BIOMEDICAL SYSTEMS, 23 - 26 March 1997, XP002258602 Warwick, England cited in the application page 57 -page 62 --- | 1-25 |
| A | STEPHEN E. REES ET AL: "Acid-base chemistry of the blood - a general model" COMPUTER METHODS AND PROGRAM IN BIOMEDICINE, vol. 51, 1996, pages 107-119, XP002258603 ISSN: 0169-2607 cited in the application the whole document ----- | 1-25 |

INTERNATIONAL SEARCH REPORT

International application No.
PCT/DK 03/00512

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☒ Claims Nos.: 1-17
because they relate to subject matter not required to be searched by this Authority, namely:
see FURTHER INFORMATION sheet PCT/ISA/210
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this International application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
1-25

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box I.1

Claims Nos.: 1-17

Claims 1-17 relate to a diagnostic method practised on the human body, in this case a method for blood evaluation useful for treatment of ill patients. Thus, the International Search Authority is not required to carry out an international search for these claims (PCT Rule 39.1(iv)). Nevertheless, a search has been executed for claims 1-17 based on the described system in claims 18-25.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-25

A method and system for estimating/calculating arterial blood values from a venous blood sample, claims 1-25.

2. Claims: 26-30

A device for anaerobic drawing of venous blood reducing residual gases in the blood sample claims 26-30.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/DK 03/00512

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|-------------------------------------------|---------------------|----------------------------|-----------------------------|
| US 2002120185 | A1 | 29-08-2002 | NONE |
| US 6206830 | B1 | 27-03-2001 | US 6036642 A 14-03-2000 |
| | | | US 5769785 A 23-06-1998 |
| | | | US 5482036 A 09-01-1996 |
| | | | US 2003097049 A1 22-05-2003 |
| | | | US 2001029326 A1 11-10-2001 |
| | | | US 2003036689 A1 20-02-2003 |
| | | | US 2002128544 A1 12-09-2002 |
| | | | US 5490505 A 13-02-1996 |
| | | | US 5632272 A 27-05-1997 |
| | | | US 6157850 A 05-12-2000 |
| | | | AT 184716 T 15-10-1999 |
| | | | AU 658177 B2 06-04-1995 |
| | | | AU 1536992 A 06-10-1992 |
| | | | CA 2105682 A1 08-09-1992 |
| | | | DE 69229994 D1 21-10-1999 |
| | | | DE 69229994 T2 27-04-2000 |
| | | | EP 1357481 A2 29-10-2003 |
| | | | EP 0574509 A1 22-12-1993 |
| | | | EP 0930045 A2 21-07-1999 |
| | | | JP 3363150 B2 08-01-2003 |
| | | | JP 6507485 T 25-08-1994 |
| | | | RU 2144211 C1 10-01-2000 |
| | | | US 2002077536 A1 20-06-2002 |
| | | | WO 9215955 A1 17-09-1992 |
| | | | US 6236872 B1 22-05-2001 |
| | | | US 6263222 B1 17-07-2001 |
| US 6163715 | A | 19-12-2000 | US 5842981 A 01-12-1998 |
| | | | AU 1839300 A 19-06-2000 |
| | | | BR 9915798 A 04-06-2002 |
| | | | CA 2354064 A1 08-06-2000 |
| | | | CN 1335756 T 13-02-2002 |
| | | | EP 1146812 A1 24-10-2001 |
| | | | JP 2003505115 T 12-02-2003 |
| | | | WO 0032099 A1 08-06-2000 |
| | | | US 2001005773 A1 28-06-2001 |
| | | | AU 720111 B2 25-05-2000 |
| | | | AU 3802997 A 09-02-1998 |
| | | | BR 9710330 A 11-01-2000 |
| | | | CA 2260928 A1 22-01-1998 |
| | | | CN 1225562 A 11-08-1999 |
| | | | DE 69724822 D1 16-10-2003 |
| | | | EP 0955869 A1 17-11-1999 |
| | | | JP 2000514683 T 07-11-2000 |
| | | | WO 9802087 A1 22-01-1998 |
| WO 0045702 | A | 10-08-2000 | AU 2278800 A 25-08-2000 |
| | | | CA 2359575 A1 10-08-2000 |
| | | | WO 0045702 A1 10-08-2000 |
| | | | EP 1152690 A1 14-11-2001 |
| | | | JP 2002536039 T 29-10-2002 |
| US 5687718 | A | 18-11-1997 | DE 4424267 A1 18-01-1996 |
| | | | GB 2291972 A ,B 07-02-1996 |